UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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JAN 2 0 2017

Joshua Frederickson
Office of the Chief of Naval Operations
Energy and Environmental Readiness Division (N45)
2000 Navy Pentagon, Room 2E253
Washington, DC 20350-2000

Dear Josh:

Thank you for meeting with the United States Environmental Protection Agency (EPA) on December 21, 2016, and January 6, 2017, to discuss the United States Navy's in-water hull cleaning of the inactive carrier the Ex-*U.S.S. Independence*, currently stationed at the Puget Sound Naval Shipyard in Bremerton, Washington. As we conveyed during our conversation, EPA has major concerns regarding the Navy's cleaning of the hull of the Ex-*U.S.S. Independence* in Sinclair Inlet and believes that the Navy is exposing itself to significant risk by proceeding. Although the in-water hull cleaning of the Ex-*U.S.S. Independence* and related discharges are covered by the Uniform National Discharge Standards (UNDS), the UNDS implementing regulations have not been finalized, meaning that the Navy could be subject to applicable state and local regulation in addition to other federal laws. While we understand the Navy has decided to move forward with the hull cleaning despite these risks, we would like to take this opportunity to explain our comments and concerns in more detail and request additional information, including water quality and sediment quality monitoring, so that we may all better understand the environmental impacts of this action.

1) Pollutant loading estimates

EPA is concerned that the Navy has underestimated the pollutant loadings and cumulative amount of contamination that will be introduced into Sinclair Inlet and the Puget Sound. The sediments in the area where the Ex-*U.S.S. Independence* is to be cleaned are already highly contaminated with metals – with both copper and zinc at or exceeding State Marine Sediment Quality Standards (SQS) [1]. Further, since the Ex-*U.S.S. Independence* is currently located within the Marine Operable Unit (OU-B Marine) of the Puget Sound Naval Shipyard Complex Superfund Site (commonly referred to as the Bremerton Naval Complex, including Naval Base Kitsap), EPA is concerned that the Superfund sediment cleanup may be adversely affected.

[1] Puget Sound Environmental Atlas Update, 1992. Puget Sound Water Quality Authority and the Washington State Department of Natural Resources.

EPA requests the following information and/or clarification:

- A figure showing the current location of the Ex-*U.S.S. Independence* superimposed over the final as-builts for the Superfund remedy implemented for OU-B Marine. This will enable EPA to evaluate environmental impacts to sediments in the vicinity of the hull cleaning.

- Explanation of the difference between the EPA (1999)[2] reported total copper that has been measured in the effluent stream near hull cleaning operations (approximately 1,600 to 2,600 mg/L (U.S. Navy, 1997)[3] and the predicted concentration (1.8 µg/L) to result from cleaning the Ex-*U.S.S. Independence* hull.

- Justification of the predicted loading concentration of copper (8.2 ug/cm^2) from the Ex-*U.S.S. Independence*. The Navy's loading calculations do not seem to consider the condition of the hull. One of the Navy's references indicates that the release of copper from the cleaning of well-maintained recreational vessels is on the order 13 ug/cm^2, which is well above the concentration of 8.2 ug/cm^2 that the Navy used in its loading calculations for the Ex-*U.S.S. Independence*. However, an analysis conducted by the Naval Post Graduate School[4] assessing the effects of Naval hull cleaning methods found that a single in-water hull cleaning using the SCAMP system would remove the equivalent of a full layer of anti-fouling paint (up to 4 millimeters) from a well-maintained hull. This would suggest a level of metal loadings beyond current Navy estimates and does not take into account the poor condition of the Ex-*U.S.S. Independence*'s hull. Please also provide the data demonstrating that the copper is depleted, as expressed by the Navy in this statement: "Visual observations and measured data indicate that the paint system on the Ex-*U.S.S. Independence* is depleted and does not have enough copper or other antifouling compounds within it to prevent fouling."

- Justification of the use of geometric mean concentrations in the scrubber data. Using geometric mean concentrations is not an appropriate representation of the true population mean. Arithmetic means should be used in these calculations because they are unbiased and scientifically more meaningful. While extremely high exposures are low-probability events, they do occur, and the arithmetic mean appropriately gives them weight in proportion to their probability. In contrast, the geometric mean gives decreasing weight as the value of the exposure increases. *See* Parkhurst[5] and Wymer and Wade[6].

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[2] United States Environmental Protection Agency. (1999). Phase I: Uniform National Discharge Standards for Vessels of the Armed Forces. (Report EPA 821-R-99-001). Washington, D.C.: U.S. Environmental Protection Agency.

[3] The Naval Command, Control, and Ocean Surveillance Center, RDT&E Division, Marine Environmental Support Office, San Diego, California. "UNDS Underwater Hull Husbandry Evaluation: In-Water Hull Cleaning." 13 February 1997.

[4] Wimmer, James. (1997). Naval Post Graduate School. Analyzing and Predicting Underwater Hull Coating System Wear.

[5] Parkhurst, D.F. 1998. Arithmetic versus geometric means for environmental concentration data. Environmental Science and Technology News. Feb. 1.

[6] Wymer, L.J. and Wade, T.J. Chapter 6. The Lognormal Distribution and use of the Geometric Mean and the Arithmetic Mean in Recreational Water Quality Measurement. In: Statistical Framework for Recreational Water Quality Criteria and Monitoring. Edited by L.J. Wymer, 2007. John Wiley & Sons.

2) Characterization of Copper Toxicity

EPA questions whether the Navy has adequately characterized the toxicity of copper and its potential impacts to Sinclair Inlet and the Puget Sound. EPA (1999) reported that, "Total copper has been measured in the effluent stream near hull cleaning operations at levels of approximately 1,600 to 2,600 mg/L." Dissolved copper in those same tests ranged from 66 to 146 mg/L, which is 28 to 61 times the Federal criterion for copper[7] and many orders of magnitude greater than species mean acute values for other sensitive marine species. The manufacturer's fact sheet on 4054 VINYL ANTIFOULING paint used on the Ex-*U.S.S. Independence* states that the compound is categorized as having extreme acute and long-term toxicity to aquatic life.

Juvenile salmonids are present throughout Sinclair Inlet. Given that hull cleaning is anticipated to take 30 days, EPA disagrees that "it is unlikely that salmonids would consume or be exposed to copper particles for prolonged periods of time."

EPA requests the following information and/or clarification:

- Please provide a citation(s) for, "LC_{50} Saltwater Toxicity data associated with 80-day old Juvenile Salmon range ~560 - 600 µg/L copper," as stated in the hull scrubber data PowerPoint presentation provided to EPA by the Navy.

- Please provide the anticipated elevated levels of copper in the water column and discuss the effects on juvenile salmonids and other sensitive marine species.

3) Long-Term Effects

- The Navy's monitoring plans for the hull cleaning of the Ex-*U.S.S. Independence* do not include monitoring long-term effects. EPA recommends that the Navy develop plans to evaluate any long-term effects from the hull cleaning.

- The manufacturer's fact sheet on 4054 VINYL ANTIFOULING paint used on the Ex-*U.S.S. Independence* states that the compound is categorized as having extreme acute and long-term toxicity to aquatic life. EPA is concerned about the impacts to aquatic life if paint is removed during hull cleaning.

4) Sediment Quality Monitoring

The Navy's proposed sediment monitoring plan involves collecting sediments at ten locations under the vessel prior to the hull cleaning but does not include post-project sampling. EPA disagrees with the Navy's assertion that the impacts from the hull cleaning would be short-term in nature. When metals are released in particulate form they accumulate in bottom sediments and become long-term/legacy pollutants. Given the shallow depth of Sinclair Inlet in this area, pollutants in these sediments can be re-

[7] Note that the Water Quality Criteria have been revised and are currently 3.1 µg/L (Acute: 1-hour, dissolved Cu) and 1.9 µg/L (Chronic: 4-day, dissolved Cu).

mobilized through currents, prop-wash, and maintenance dredging. Therefore, EPA requests that the Navy expand its sediment sampling to include collection and analysis of sediments post-project to evaluate potential long-term effects from the hull cleaning. Post-project characterization of the sediments should include a series of transects and the collection of sediment samples at a prescribed interval along the transects, as well as sampling at the same ten locations that were sampled pre-hull cleaning. Sediment samples will be analyzed for copper, zinc, mercury and PCBs (the latter being contaminants of concern in OU-B Marine at the Puget Sound Naval Shipyard Complex Superfund Site). The Navy should develop a robust post-project sediment sampling plan in accordance with a quality assurance plan prepared in conformance with the Navy's quality assurance/quality control guidance and in coordination with the CERCLA Remedial Project Manager for OU-B, Karen Keeley (keeley.karen@epa.gov).

As EPA conveyed in an email on January 5, 2017, the Superfund Program considers the proposed action a potential source of CERCLA hazardous substances, pollutants, and/or contaminants to the sediments in OU-B Marine and intends to require additional environmental sampling of sediments to ensure the protectiveness of the remedy. If post-project monitoring reveals exceedance of state sediment quality standards, mitigation, and/or response actions under state or federal law, may be required. EPA requests that the Navy provide pre- and post-sediment sampling information, including quality assurance documentation, to EPA within 60 days of project completion.

5) Water Quality Monitoring

The Navy's Sampling and Analysis Plan for Water Quality Monitoring of Biofouling Removal from the Ex-*U.S.S. Independence* included the results from a GNOME/CH3D simulation. This simulation identified an area of influence during differing tide stages. Proposed water quality monitoring stations (Figure 8) include locations immediately around the vessel and outside the area of influence (as reference stations). However, the Sampling and Analysis Plan describes water quality sampling events to occur only one and three weeks after the hull cleaning is complete. Water monitoring during hull cleaning and to the east of the Ex-*U.S.S. Independence* within the area of influence should be added to this Sampling and Analysis Plan in order to capture the maximum concentrations in the water column and to determine if the hull clean is in compliance with State Water Quality Standards. The Navy should provide water quality monitoring data to EPA (Erika Hoffman - hoffman.erika@epa.gov) on a weekly basis for review.

6) Future Hull Cleaning Activities

EPA believes it would be advantageous to both our agencies to learn from the experience with the Ex-*U.S.S. Independence* and influence decision-making for the Navy's future hull cleaning projects.

(a) Best Management Practices

In its response to the Navy's request for informal consultation under section 7(a)(2) of the Endangered Species Act and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH), dated August 5, 2016, NMFS recommended that the Navy take the following actions to avoid, mitigate, or offset the impact of the hull cleaning on EFH: (1) isolate the

area around the ship with a silt curtain; (2) remove the accumulated debris using a dredge or other suitable method as soon as possible after the cleaning; and (3) monitor water quality in the immediate vicinity of the ship as well as at more distant locations before, during, and after cleaning. In its September 1, 2016 response, the Navy declined to follow the first two recommendations.

In EPA's December 2016 meeting with the Navy, you mentioned at least two additional vessels located at the Puget Sound Shipyard, which will undergo similar cleaning, towing and dismantling activities. Please explain efforts the Navy is taking to ensure the hull cleaning of these vessels occurs in accordance with NMFS' recommendations or best management practices, such as dry-docking, a vacuum SCAMP or other collection/control technology.

(b) Biological Evaluation

The Navy's Biological Evaluation for the Ex-*U.S.S. Independence* did not address sublethal effects to salmonids that occur at part per billion concentrations, nor does it address the likelihood of toxicity to benthic and epibenthic organisms. The Biological Evaluation (e.g., pages 3-7 to 3-10) indicates that the potential for ingestion of copper containing solid particles by aquatic species has not been evaluated. Given the elevated concentration of copper in paint chips, dietary ingestion could be a significant source of copper and other metals to aquatic species in the immediate vicinity of antifouling activities. It also appears that the copper concentrations in surface water predicted or measured from the Forbes (1996) study of boat hull cleaning cited in the Biological Evaluation are in the mg/L range (28 - 166 mg/L). These concentrations are substantially higher than the observed copper concentrations shown to be associated with toxicity to marine fish (<100 µg/L in some cases) found in EPA's literature review of copper toxicity to fish. EPA recommends that the Navy consider (a) sublethal effects to salmonids, (b) the toxicity to benthic and epibenthic organisms, and (c) the potential for ingestion of copper containing particles by aquatic species in future biological evaluations pertaining to hull cleaning of inactive Navy vessels.

EPA remains committed to our mutual goal of protecting Sinclair Inlet from additional impairment and to ensuring that similarly situated vessels are cleaned in a manner that minimizes environmental impacts. If you have any questions or concerns about this letter, please contact Michael Rylko, Senior Technical Coordinator, at (206) 553-4014 or rylko.michael@epa.gov.

Sincerely,

Peter Murchie
Manager, Puget Sound Program and National Estuary Program